

## Japanese Beetle

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### What You Should Know

- Japanese beetle was initially detected in Orem, Utah, in July 2006.
- Adults have a broad host range (over 300 plant species) and can cause significant damage.
- Immature grubs prefer to feed on turfgrass roots and spend about 10 months of the year under the soil surface.
- Homeowners can successfully manage Japanese beetle with proactive cultural practices, biological control and reduced risk insecticides.



Fig. 1. Adult Japanese beetles feeding<sup>2</sup>

The Japanese beetle, *Popillia japonica* Newman, can be a highly destructive pest to ornamentals, trees, shrubs and turfgrass. First discovered in the eastern United States in 1916, the Japanese beetle has threatened agriculture and horticulture by slowly moving south and west. In 2006, a small population of adult Japanese beetles was detected in Orem, Utah. The invasive pest is especially harmful because the adults and immature grubs feed on plants and can cause significant damage when in high numbers. Together, the adults and grubs feed on more than several hundred plant species; some of the most susceptible plants are grown in Utah. Adult beetles feed on the upper leaf surface, removing the soft tissue of the leaf and releasing a strong aggregation pheromone that attracts additional beetles to a potential food source (Fig. 1).

### Damage Symptoms

Feeding damage by Japanese beetle adults is commonly seen as holes or skeletonized leaves (Fig. 1). Adults are highly attracted to rose, apple, stonefruits (peach, plum, cherry), basswood/linden, willow, elm, grape, birch, Japanese and Norway maples, pin oak, horse chestnut, and sycamore.

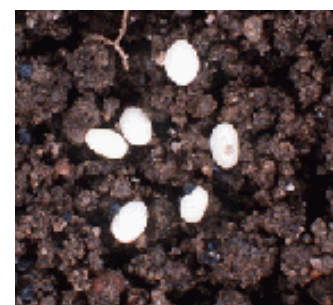
Without actively looking for grubs under the soil surface, grubs often go unnoticed until September, when large patches of turf are destroyed. Evidence of grub damage begins as localized discolored patches, but can enlarge and coalesce in just a few weeks. In some cases, heavily damaged turfgrass can feel spongy and be easily pulled away from the soil surface. Drought conditions can make turfgrass injury worse than in a healthy lawn.

### Description

Adults are oval, metallic green with bronze-colored wings, and are about ½" long (Fig. 2). Males can be slightly smaller than females. Adults have six white tufts of hair along each side of the body (Fig. 2). Grubs are creamy white, C-shaped, and 1" long when fully grown (Fig. 2). Adults are found clustered together on plants and grubs can be clumped under the soil of turfgrass.



adult<sup>2</sup>



eggs<sup>1</sup>



larva<sup>1</sup>



pupa<sup>1</sup>

Fig. 2. Japanese beetle life stages

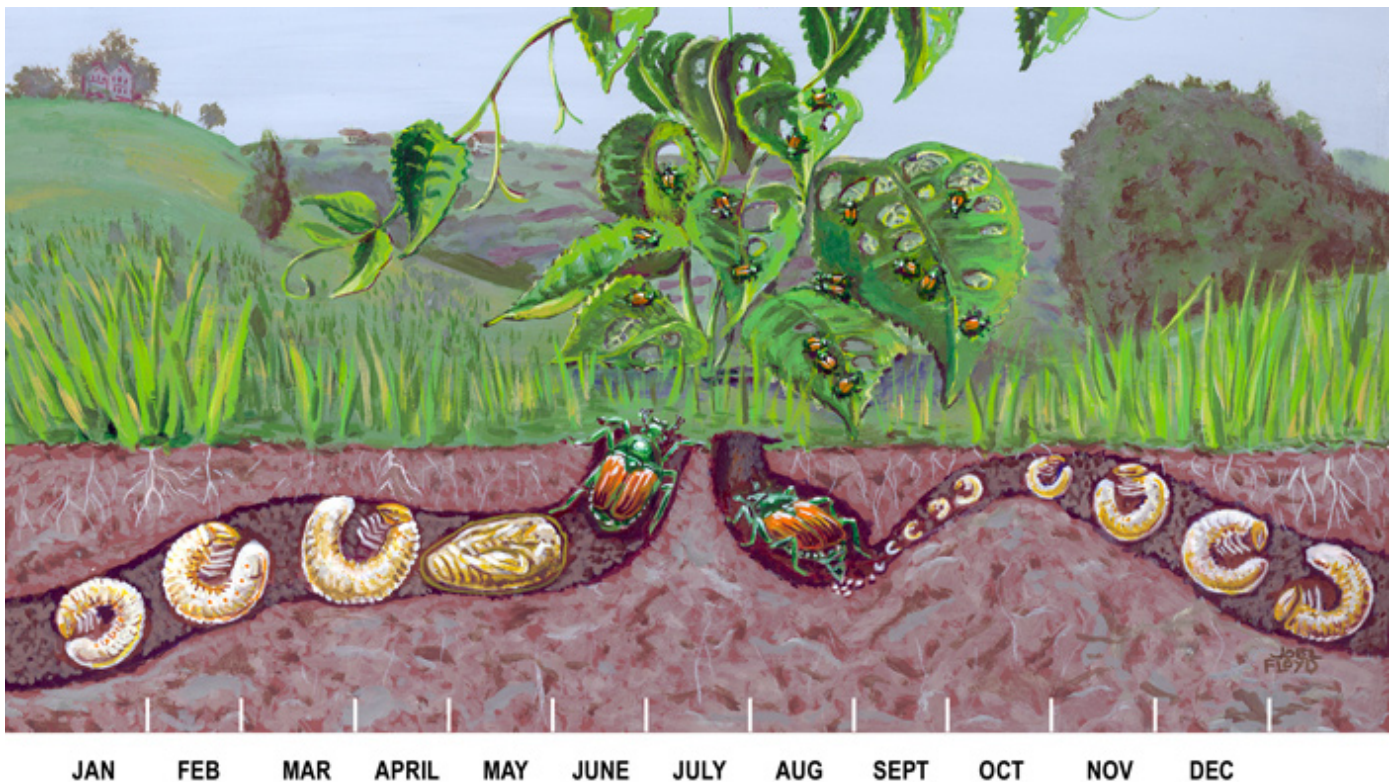


Fig. 3. Illustration of Japanese beetle life cycle<sup>1</sup>

### Life Cycle

Japanese beetles have one generation per year and grubs spend about 10 months under the soil surface (Fig. 3). Adults emerge from turfgrass in late June and immediately begin to feed on low-lying plants such as roses and shrubs. Adults eventually move up on tree foliage to feed and mate. Mated females move back to turfgrass to lay small egg masses in soil cavities. Females prefer to lay eggs in healthy, vigorous turfgrass and will avoid stressed lawns. Most eggs (Fig. 2) are laid between mid-July and early September. The eggs hatch into small grubs that feed on roots underground until late September when the temperature cools. The almost fully-grown grubs burrow 4-8" down in the soil and remain inactive all winter. In the early spring, grubs become active again and feed until turning into resting pupae (Figs. 2, 3). The pupae hatch into adults and emerge from the soil. See Figure 3 for a complete life cycle diagram.

### Sampling Protocol

Begin looking for grub activity in early June (before adult emergence) by taking a few evenly spaced turfgrass samples. Cut a 6" x 6" square on three sides or hand trowel to examine the upper 2" of the root zone (Fig. 4). If the turf is dying and grubs are absent, examine the soil for other causes of injury, such as disease, excessive thatch, moisture stress, heat damage or other insect feeding (Fig. 4). After looking through the soil sample, replace the soil and return the turf. During the summer, look for adults on ornamental plants, trees and shrubs. Scout susceptible plants at least once per week, especially if adults were active the previous year. Adults are especially attracted to ripening fruits and rose buds.



Fig. 4. core soil sample and upper turfgrass root zone<sup>3</sup>



## Control Options

Once Japanese beetle becomes established, eradication is very difficult and complete control is unlikely; however, beetles are suppressed to tolerable levels in their native range. Parasitic wasps, flies, and birds can be very effective biological control agents. Using broad spectrum insecticides for low densities of Japanese beetle is unnecessary and will reduce biological control. Using natural enemies and other integrated pest management (IPM) strategies can reduce adults and grubs to tolerable levels in most situations. Here is a list of cultural control methods homeowners can use to reduce the impact of Japanese beetle damage:

- Keep plants healthy by following a recommended irrigation and fertilization schedule. Encourage natural enemies by planting a diversity of flowering plants that produce pollen and nectar.
- Include a mix of non-attractive plants, such as lilac, forsythia, dogwood, magnolia, and American holly, to discourage large numbers of adults on ornamentals.
- Start monitoring for grubs in the early spring by taking a few soil samples, and scout for adults in the summer by inspecting attractive plants, such as rose, apple, stone-fruits, basswood/linden, crabapple, asparagus, and birch.
- If adult feeding damage becomes noticeable, simply remove the beetles during the warmest part of day (when they are most active) by hand and drop into a jar of soapy water.

In certain situations where persistent Japanese beetle damage is documented over multiple years, a more aggressive control program can be initiated. Set up a sex pheromone/floral lure trap (Fig. 5) to help estimate initial and peak adult emergence. The trap should catch about 75% of the beetles in that area; but be sure to place the trap on the edge of the property or away from susceptible plants (see product ordering information on page 3).



Fig. 5. Japanese beetle trap<sup>3</sup>

The treatment threshold for Japanese beetle grubs in turfgrass is 8-10 per ft<sup>2</sup> (15 per ft<sup>2</sup> in a healthy lawn) with obvious visible damage. Chemical control should be considered only when cultural methods are not effective. In June, use a long-lasting "reduced risk" insecticide, such as imidacloprid (Merit), to target eggs before they hatch into grubs. Other reduced risk pesticides include: Concern, Pyganic, and Surround. When targeting small grubs later in the summer, consider commercially available insect pathogens for biological control. Pathogens effective against Japanese beetle include a bacterium called milky spore, *Bacillus popilliae*, and a nematode called *Heterorhabditis bacteriophora*. Highly infested turfgrass may need an additional treatment of dimethyl phosphonate (Dylox) in July to kill small grubs. Here are some guidelines for effective chemical control in turfgrass:

- If the thatch layer exceeds ½", use a light aerification to enhance soil penetration.
- Apply ½" of water 48 hours before chemical application to bring feeding grubs closer to the soil surface.
- Immediately apply ½ - ¾" of water after application to push the chemical down to the root zone.
- Repeat irrigation every four or five days to continue chemical movement in the soil.

Adults are above ground for only a short time (Fig. 3), and applying insecticides to trees, shrubs and other ornamentals is not recommended because the chemicals are expensive and generally not effective. In extreme situations, traditional insecticides, including carbaryl (Sevin), malathion, and permethrin (Pounce, Bayer Advanced) can be used.

## Japanese beetle "Xpando Trap" order information:

Trece Incorporated  
P.O. Box 129  
Route 1, Box 1765  
Adair, OK 74330

Phone: 866.785.1313  
Fax: 918.785.3063  
<http://www.trece.com>

<sup>1</sup> Images courtesy of USDA-APHIS ([http://www.pueblo.gsa.gov/cic\\_text/housing/japanese-beetle/jbeetle.html](http://www.pueblo.gsa.gov/cic_text/housing/japanese-beetle/jbeetle.html)).

<sup>2</sup> Images courtesy of Marlin Rice, Iowa State University Department of Entomology (<http://www.ent.iastate.edu/>).

<sup>3</sup> Images courtesy of Erin Hodgson, Utah State University Department of Biology ([www.utahpests.usu.edu/photogallery](http://www.utahpests.usu.edu/photogallery)).

**Precautionary Statement:** All pesticides have benefits and risks, however following the label will maximize the benefits and reduce risks. Pay attention to the directions for use and follow precautionary statements. Pesticide labels are considered legal documents containing instructions and limitations. Inconsistent use of the product or disregarding the label is a violation of both federal and state laws. The pesticide applicator is legally responsible for proper use.

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